



Appendix A

Appendix A: Qualifications and Curriculum Vita for Dr. Andy Davis

1 Qualifications of Dr. Davis

1.1 Educational Background

Dr. Davis received a Bachelor of Science (BS) degree in Applied Biology from Liverpool Polytechnic in 1975; a Master of Science (MS) degree in Environmental Sciences, with a specialty in geochemistry, from the University of Virginia in 1979; and a Doctor of Philosophy (PhD) degree in Geology, with a specialty in geochemistry, from the University of Colorado in 1985.

1.2 Research and Teaching Experience

From 1991 through 1994, Dr. Davis was an adjunct professor at the Department of Geological Sciences, University of Colorado, where he taught a course on the fate and transport of organic compounds and was a member of one PhD and two MS candidate committees. He has published over 70 papers in the peer-reviewed scientific literature, and is frequently requested to provide peer review of articles submitted to scientific journals. Dr. Davis's curriculum vita, including a list of professional papers, is attached as part of this appendix.

1.3 Consulting Experience

Dr. Davis is the President and Director of Geochemistry for Geomega Inc. He has over 25 years of professional experience in the field of hydrogeochemistry, primarily in evaluating the fate and transport of chemical compounds during standard investigation activities at contaminated sites across the United States. As part of this process, he has become familiar with techniques for sampling, testing, and analyzing for the presence of chemical compounds. He also has experience with a variety of computer models, including geochemical, unsaturated zone, surface water, and groundwater transport models, and has been responsible for their use in predicting the fate and transport of chemical compounds in the environment.

Both classical statistics and statistical estimation techniques have been utilized by Dr. Davis to compare spatial (varying in geographic location) and temporal (varying in time) data of multiple monitoring wells at contaminated facilities. In addition, he has used statistics to evaluate the efficacy of sampling programs and patterns, generate site-specific estimates of background metals concentrations, and compare alternative or existing sampling results from various soil locations.

Dr. Davis has been invited to present the results of his research at academic symposia, seminars, and hazardous waste trade conferences. Additionally, he has served on both industrial and governmental expert panels discussing metal geochemistry.

1.4 Previous Testimony (last four years).

Plaintiff	Case	Defendant	Deposition Date	Date of Trial Testimony
<i>Ayala et al.</i>	v.	<i>Phillips Properties (UP Railroad)*</i>	9/8/04, 10/15/04, 3/29/2006	<i>Ongoing</i>
<i>Pharmacia*</i>	v.	<i>Clayton Chemical et al.*</i>	9/14/04	<i>Cancelled</i>
<i>Eva Zuniga</i>	v.	<i>Chevron Texaco*</i>	<i>None</i>	<i>Trial 3/29/05</i>
<i>Holder</i>	v.	<i>Gold Fields*</i>	6/28/05	<i>Ongoing</i>
<i>US DOJ</i>	v.	<i>Olin*/Colgate*</i>	7/17/05	<i>Settled/Ongoing</i>
<i>Michael</i>	v.	<i>Chevron*</i>	9/12/05	<i>Settled</i>
<i>The Pinal Creek Group*</i>	v.	<i>Newmont et al.</i>	5/11/06 7/25/2008	<i>Ongoing</i>
<i>Robert M. Friedland*</i>	v.	<i>TIC-The Industrial Company</i>	10/4/2006	<i>Ongoing</i>

*Party that engaged Dr. Davis.

2 Compensation

Dr. Davis is employed at Geomega Inc. For his work related to this case, the company is compensated at \$200/hour for technical work, \$600/hour for depositions, and \$400/hour for court testimony.

3 Preparation and Content of This Report

Specific documents, data, and/or other information that Dr. Davis has relied on and considered in forming his opinions in this case are listed in the document index and references section of this report. His opinions are also based on his education and experience as described herein, relevant scientific journal articles or textbooks, and observations and tests performed during site visits.

4 Trial Exhibits

Dr. Davis may use as exhibits at trial any document contained in or referred to in this report, summaries of the contents of or supplements to this report, any document listed as a trial exhibit or provided in discovery by the parties, any documents considered by the parties' experts, or any document needed to respond to or rebut testimony given on behalf of any party. Dr. Davis reserves the right to provide lists of exhibits as permitted by the Federal Rules of Civil Procedure and the Scheduling Order in this case.

5 Reservation of Rights

Due to ongoing document acquisition in this case, Dr. Davis reserves the right to supplement or modify his opinions based on additional documents or information that may be produced following the submittal of this report, as well as to supplement the exhibits that he may use at trial. Additionally, he reserves the right to obtain and review additional information, and to incorporate such information into additional analyses and reports. Additional analyses may be conducted as necessary for any of the following reasons: (1) to respond to expert reports, including but not limited to rebuttal reports; (2) to respond to new information; (3) to respond to deposition testimony as it is provided; and (4) as permitted by the Federal Rules of Civil Procedure.

Andy Davis, PhD
Director of Geochemistry
President

Experience Summary

Dr. Davis has solved environmental problems for industrial clients for over 20 years, primarily at RCRA and CERCLA sites. He frequently negotiates with government agencies on behalf of industrial clients. As a member of the faculty of the Department of Geological Sciences at the University of Colorado, Dr. Davis taught *The Fate and Transport of Organic Compounds in the Environment*. He has managed projects at environmental sites in the US and abroad, e.g., refinery and oil field releases (5), landfills (8), CVOC sites (12), chemical manufacturing and formulation facilities (>25), NRDA (3), and Superfund sites (>15). Among his published body of work (over 60 papers in the peer-reviewed scientific literature) are contributions to human and ecological risk (>10), technical cost allocation (>10), natural attenuation of groundwater contaminants (8), and optimization of soil remediation volumes (3). He has spent more than 58 days in deposition and testified in court eight times. Married with four children, Dr. Davis has played soccer for 45 years and coaches youth soccer and basketball teams.

Credentials

PhD - Geology (Geochemistry)

University of Colorado (1985)

MS - Environmental Sciences (Geochemistry)

University of Virginia (1979)

BS - Applied Biology

Liverpool Polytechnic (1975)

Employment History

1995-present: President / Director of
 Geochemistry, Geomega
 1991-1994: Adjunct Professor,
 University of Colorado
 1988-1995: Principal Geochemist,
 PTI Environmental Services
 1985-1988: Senior Geochemist,
 Camp Dresser & McKee

Voluntary Service

Reviewer: *Environmental Science & Technology*,
Applied Geochemistry, *Groundwater*, and others.
 Associate Editor: *Journal of Environmental Forensics* (1999-present).

Key Projects

A reprint or manuscript is available for the super-scripted projects, referenced to the publication list.

*Litigation projects.

Photographic Interpretation

Provided expert testimony in connection with apportionment of mining-related remedial costs at Lower Area One, Butte, MT.⁶⁷

Analyzed the source of lead in soils at a steel mill, New Haven, CT.

*Incorporated an aerial photographic analysis to investigate temporal impacts of mining in the Summitville district, CO.

*Used ISC3 and EPA emission factor algorithms to model atmospheric transport of arsenic to a residential district from the Lite Yard, MN. Allocated contributions from different eras.

Developed a site conceptual model and allocation strategies at the Shoreham rail yard, MN.

Cost Allocation

Led technical team; currently a designated expert witness for cost allocation of the Pinal Creek acid groundwater plume in the Miami, AZ, mining district.^{68, 69, 70, 71, 72}

*Assessed factors that contributed to the onset of AMD at Summitville, CO. Allocated temporal releases over the life-of-mine.

Developed GIS approaches to determine the proportion of orphan claim-related acid groundwater in the Berkeley Pit, Butte, MT.

Technical lead for allocation of petrochemical releases at the former Paragon facility, Brooklyn, NY.

*Discriminated between chlorinated solvent plumes (TCE, DCE, CA) at the Stanford Research Park Superfund site, Palo Alto, CA. Used groundwater modeling to allocate remedial costs.¹⁰

*Investigated the variables affecting TCE transport in the subsurface in support of cost allocation negotiations at the MEW Superfund site, Mountain View, CA.¹⁰

Demonstrated dual sources of TCE in a cost allocation matter, Caribe, Puerto Rico.

*Used lead:zinc ratios to quantify contributions from two co-deposited waste streams at the Walton Landfill, Fort Worth.

Conducting a source allocation exercise for CVOCs and metals in groundwater migrating from the Sauget site, St. Louis, toward the Mississippi.

*Investigated metal transport and conducted cost allocation at the Lowry Landfill, CO.

Responsible for the allocation of contaminated sediments in Gum Creek, Tifton, GA.

Air/Deposition

Determined lead bioavailability in dust resulting from destruction of the World Trade Center, NY.

*Developed loading model for atmospheric deposition of arsenic onto a residential area adjacent to a pesticide manufacturing facility, Richmond, CA.

Investigated atmospheric transport of lead and zinc from industrial sources to pristine lakes in the eastern United States.²

*Evaluated arsenic and lead deposition in a residential area adjacent to an arsenical pesticide manufacturing facility, Watsonville, CA.

*Investigated the airborne distribution of arsenic in soils around Tacoma, WA.

Used forensic geochemical techniques to distinguish between airborne dioxin sources in Tifton, GA, soils.⁴⁵

*Evaluated the extent of atmospheric metal deposition from the Globeville smelter on soils in Commerce City, CO.

Acid Mine Drainage (AMD)

Demonstrated that acidic groundwater in the historical Copper Canyons district was due to naturally occurring mineralization.

Prepared a site model for the Copper Basin/Ocoee River, TN.

*Used column experiments to assess the migration of As, Cu, Pb, and Zn to groundwater from soils impacted by tailings deposits.

Modeled the effect of tailings collapse, mine blow-out, and remedial actions on water quality in Clear Creek, CO.

Evaluated the geochemistry of AMD in Clear Creek, CO.^{7,11}

Developed a coupled model to evaluate waste rock oxidation in relation to source/receptor relationships in the Robinson District, Ely, NV.

Performed a water quality study to determine the impact of AMD on Contrary Creek, VA.

Evaluated the effect of waste rock dump age and mineralogy on reactivity in the historical Robinson District, Ely, NV.⁵²

Compared analytical methods used to assess the relevance of total metals analysis to water quality criteria for Cd, Cu, Fe, Pb, Mn, and Zn.¹⁷

Used stable isotopes and REEs to differentiate between groundwater sources at the Robinson District, Ely, NV.⁶¹

Acid-Metal Groundwaters

Investigated a metal-mobilized groundwater plume at a Pascagoula, MS, refinery as part of a demonstration of natural attenuation (accepted by the US EPA).

Explained the mechanism relating arsenic migration with phosphoric acid in groundwater at a styrene manufacturing facility, Carson, CA.

Mine Development/Closure

Lead hydrogeochemist permitting the Big Ledge barite mine, Wells, NV.

Investigated the fate and transport of metals and transuranic elements in an alluvial aquifer, Canon City, CO.^{3,6} (PhD)

Predicted pit lake chemistry conditions, focusing on rare earth and transuranic elements, at the Mountain Pass Mine, CA.⁵⁰

Assessed the pit lake chemistry, marine tailings outfall, and waste rock chemical interactions at the Batu Hijau project. Represented client in presentations to the Indonesian government.⁶⁵

Conducted a study to assess potential waste dump stability and revegetation, evaluate tailings impoundment groundwater impacts, optimize waste rock handling, and determine water quality in existing pits and water quantity impacts due to renewed mining activity in the Robinson District, Ely, NV.^{32,51, 53, 54, 55, 62}

Evaluated source-receptor relationships in site groundwater at the Golden Sunlight mine, MT and assessed efficacy of backfilling the pit with waste rock.

Evaluated entombment of flue dust in caverns at the Campbell Mine, Ontario.

Developed closure strategies for three dry pits and two incipient wet pits at the Getchell Mine, NV.

Performed water quality sampling and geochemical modeling of the acid rock drainage filling the Berkeley Pit, Butte, MT, to evaluate liming as a remedial alternative.⁸

Responsible for limnological characterization and geochemical predictions of future pit lake chemistry for the Pipeline Project.^{42, 58}

Conducted investigations of potential water quantity, water quality, infiltration ponds, and waste rock impacts for the proposed South Pipeline Project, Crescent Valley, NV.^{56, 66}

*Used batch experiments to investigate the solubility of copper and zinc in surface waters resulting from acidic runoff from adjacent tailings during thunderstorms.

*Investigated the efficacy of liming as a long-term remedial alternative to control acid generation in tailings.⁴⁷

Investigated the effect of mixing tailings and waste cake on lead attenuation in a rare-earth waste stream at Mountain Pass, CA.³⁷

Employed batch and column experiments, together with geochemical and hydrodynamic models, to determine pit water chemistry following cessation of mining at the Gold Quarry, Elko, NV.^{38, 48}

Developed methods to assess the impact of pit backfilling on residual pit lake water quality in the Twin Creeks pit lake, NV.⁶¹

Developed an approach to assess pit lake chemistry at Twin Creeks mine, Golconda, NV. Subsequently defined a strategy to enumerate backfill/pit lake interactions.

Responsible for groundwater modeling and pit lake geochemistry at the Genesis pit, Elko, NV.

Developed an approach to assess pit lake chemistry at Lone Tree mine, Humboldt County, NV.

Responsible for technical work conducted in support of the Mt. Hamilton, NV, heap closure.

Responsible for closure of Bald Mountain heap leach pad #1. Developed interactive models that incorporated vadose zone hydraulics and multi-valent geochemistry with biotoxicity affects of As and Se. Prepared EA for BLM, Ely District.⁶¹

Metals: Specific

Lead (Pb)

Demonstrated that lead was immobilized by phosphorus at a port facility in Pascagoula, MS.²³

*Used electron microscopy to demonstrate that much of the soil lead attributed to historical smelting in Omaha was actually due to lead paint and other urban sources. Examined mine waste mineralogy in comparison to background metal conditions.

Evaluated the source of Pb in drinking water, Luzerne County, PA.

Used Pb²¹⁰ methods to determine the age of sediment varves in remote Adirondack lakes and quantified Pb partitioning into basal sediment.^{1,18}

Evaluated the toxicity of mine-waste-related Pb minerals at the Pecos mine, NM.

Conducted a geochemical evaluation of lead migration from slag at Leadville, CO.

*Demonstrated that vitrification of hazardous waste to form aggregate rendered Pb nonhazardous.³⁵

Arsenic (As)

Investigated the factors controlling As transport at a chemical manufacturing plant in Trenton, MI.

Used laboratory tests to determine if As in Ironite (a commercial fertilizer) would present a health hazard under normal rates of application.

Responsible for bench-scale tests that evaluated injection of ferrous chloride and subsequent precipitation of amorphous ferric hydroxide as a method to attenuate arsenic and chromium migration in groundwater.

Responsible for laboratory verification of the efficacy of a process designed to extract precious metals from flue dust while producing a refractory waste product that would not leach arsenic, cadmium, copper, or lead.²⁵

Conducted risk assessment to reclassify a nursery containing soil-As from potentially residential to commercial, Ocoee, FL.

Chromium (Cr)

Analyzed migration of Cr in the subsurface and tested technologies designed to both enhance and retard migration of Cr(VI) in the alluvial aquifer at a wood treatment site in California.²⁹

Mercury (Hg)

Invited to present papers at Hg-experts conferences sponsored by Alcoa (1996) and the US EPA (2001).

Senior author of soil Hg bioavailability paper sponsored by ATSDR.⁴¹

Interpreted factors controlling Hg migration patterns in groundwater at a fungicide plant, LaSalle, Quebec.

Conducted a geochemical investigation into the factors controlling transport of mercury, arsenic, chromium, and lead at a tanning, rendering, and abandoned chemical manufacturing facility, Woburn, MA.²⁷

Responsible for development of an immunoassay response method to determine Hg in process wastewater at the 1µg/L level. The method was used to assist in source abatement measures at a plastics manufacturing facility on the Ohio River.

Elucidated the factors controlling Hg geochemistry in the Lake Onondaga water column, New York.

Nickel (Ni)

Developed a risk-based approach to evaluate the bioavailability of Ni-bearing sediment in a stretch of the Quinnipiac River, CT.

Responsible for As bioavailability study of soil and house dust, Balmertown, Ontario. Later acted in a peer-review capacity to plan flue dust reprocessing at the facility.

Investigated the form of As and Ni in fly ash from 11 coal power plants.⁶⁶

Petrochemical Facilities

Technical interface assisting an oil company in a multiparty group investigating disposition of COCs to the Lower Willamette River, OR.

Evaluated environmental impacts of crude oil production in the Cat Canyon oil field.

*Delineated source of BTEX, VOCs, and MTBE in LNAPL, soils, and groundwater at the Sparks Terminal site, NV.

Quantified partitioning of benzene between groundwater, soil, and entrained petroleum hydrocarbons at a fuel storage facility, Valdez, AK.

*Interpreted gasoline constituent distribution at a former blending facility, Denver, CO.

Assessed benzene attenuation in a submerged alluvial aquifer smear zone, Fairbanks, AK.

*Determined an age range for a gasoline release in San Diego, CA.

Responsible for implementing remediation of benzene-contaminated groundwater at a styrene manufacturing facility, Carson, CA.

Investigated the geochemical factors controlling migration of arsenic, phosphate, benzene, toluene, and MTBE at a chemical plant in Long Beach, CA.

Responsible for data collection from, and site remediation of, gasoline-contaminated soils at a Longmont, CO, service station.

Discriminated between gasoline plumes emanating from contiguous service stations, Hawthorne, Los Angeles.

Compared TCLP and headspace measurements with a modified extraction procedure to evaluate alternative analytical procedures for benzene leachability in soils.

*Evaluated source of petrochemical constituents from gas stations, Fort Worth, TX.

Refineries

Differentiated between crude, bunker oil, diesel, and gasoline released into the environment from 1946 through 1997, Whitehorse, Yukon.⁷⁶

Analyzing remedial options at the Chevron Kenai former refinery, Alaska.

Responsible for a preliminary risk characterization at the Conoco refinery, Commerce City, CO.

Evaluated MNA as a remedial approach at a Pascagoula refinery, MS. Presented findings to EPA Region IV.

Chlorinated Solvents

Evaluated TCE biodegradation and mobility at a site in San Jose, CA.

Assessed leachability of halogenated organics (PCE, TCE, DCE, VC) from contaminated aquifer material using an innovative bench-scale laboratory leaching technique.⁹

Evaluated chlorinated solvent, lead, and arsenic transport in soils and groundwater at the Western Processing site, Kent, WA.

*Evaluated the fate and transport of chlorinated solvents in soils and groundwater at a site in Boulder, CO.

Represented a 27-member PRP group negotiating remedial actions with the RWQCB for soils impacted by chlorinated solvents in El Monte, CA. Issues related to low-level volatilization of CVOCs from groundwater.

Developed methods to determine the migration rate of PCE and TCE, and potential *in situ* degradation of

organic constituents in the alluvial aquifer at the Rocky Mountain Arsenal (off-post), Denver, CO.

Evaluated migration of chlorinated solvents from a dry-cleaning facility, Seattle, WA.

Performed bench-scale tests to remediate soils contaminated with chlorinated aliphatic compounds (TCE, PCE, and TCA) by volatilization at a Superfund site, CA.¹³

Studied the long-term degradation of DNAPL containing carbon tetrachloride, EDC, PCE, and TCE in groundwater, Port de Bouc, France.⁶⁰

Sediments

Developed a method to assess effects of sediment metals in gravel on fish fecundity.⁶²

Investigated factors controlling flux of arsenic, chromium, and lead through sediments in a shallow pond in Woburn, MA.³³

Performed multivariate statistical analysis of tailings data along Silver Bow Creek, MT.

Conducted geochemical and ecological analysis of water/sediment interactions in the freshwater/brackish/marine Castro Creek fluvial system. Demonstrated that As in the bed sediment occurred in a nonbioavailable form (as sulfides).

Used ¹³⁷Cs in conjunction with bulk sediment chemistry, optical microscopy, EMPA, and LIMS to distinguish between different sources of As in receiving sediments in the Hylebos Waterway, Tacoma, WA.⁴³

Demonstrated that agricultural withdrawals and feedlot chemistry, rather than mine dewatering, controlled the sediment load and chemistry of the Humboldt River, NV.

Developed an innovative approach to determine risk of dioxin in groundwater and conducted bioassays for metals in pond sediments at a former wood-treating site in Florida.

Evaluating exit strategies and the impact of creosote on sediments at a former wood-treatment site, St. Maries, ID.

NRDA Activities

*Used Pb:Cu ratios to discriminate and allocate between sources of metals in sediments and over-bank deposits in the Clark Fork River, MT.^{57, 59, 63}

Evaluated cost structure of an NRDA claim on the Snokomish River, WA.

Landfills

Investigated TCE migration in groundwater from the Merlin landfill, OR.

*Used sulfur isotopes to distinguish between sulfide-S from mining sludge disposed at the Sinton landfill, Corpus Christi, TX, from that emanating naturally from oil deposits.

Performed statistical analysis comparing groundwater quality upgradient and downgradient from the Benicia landfill, CA.

Provided technical support to the BLM at the Flora Vista landfill, NM.

*Evaluated the effect of Kaylo disposed at the Buzby landfill, NJ, based on Cr and asbestos distribution in soils, sediments, and groundwater.

Used isotopes to investigate the relation between local meteoric and regional groundwater at the City landfill, Detroit, MI.

Assessed the mobility and toxicity of copper sulfide in vanillin black liquor solid (VBLS) at the Tulalip landfill, WA.

Statistically discriminated between groundwaters at the IndustriPlex site, MA.

Developed statistical methodology to determine background metal concentrations at Rocky Mountain Arsenal, CO.

Pesticides

Investigated the fate and transport of chlorinated and phosphorylated pesticides at a formulation facility in Tifton, GA.

Designed and implemented a program to investigate the transport and biodegradation of MTBE, pentachlorophenol, and mineral spirits in an aquifer underlying a wood treatment facility, Dania, FL.²²

Principal investigator for a rat *in vivo* bioavailability study using DDT-contaminated soils from California.

Developed coupled fate and transport models that resulted in \$3 million in soil excavation savings at an environmental justice site in Tifton, GA.^{34, 44, 46}

Investigated biodegradation rates of α -, β -, δ -, and γ -BHC in Orlando, FL, groundwater.

Conducted a risk analysis of the effect of captan-, foltan-, and ofurace-related releases at an Ag-chem facility, Port de Bouc, Marseille, France.

Responsible for determining the distribution of aldrin, endrin, and dieldrin in soils at the Rocky Mountain Arsenal, CO.

Conducted an investigation to characterize organochlorine pesticides remnant in two brine ponds as part of a RCRA facility closure.

Demonstrated application of monitored natural attenuation of chlorinated pesticides in Tifton, GA, groundwater.⁴⁹

Demonstrated that arsenic and lead occurring in ironite used as a domestic fertilizer were stable as arsenopyrite and galena, respectively.

Developed a laboratory technique to accurately quantify partitioning of chlordane between groundwater, soil, and the carrier compound at a pesticide facility in Orlando, FL. Demonstrated natural attenuation of BHCs in site groundwater.⁶⁴

Assessed pesticide fate and transport at a DDX / toxaphene site, Cleveland, OH.

*Investigated factors relating to environmental fate and transport of technical Bux, Muskegon, MI.

Wood Treatment Sites

Compiled IASD for the treatment of arsenic, chromium, PCP, and dioxins/furans in contaminated soils, sediment, and groundwater at the Baxter wood treatment site, CA.

Polynuclear Aromatics

Developed a geochemical database to assess the fate and transport of 53 PCB congeners in river sediment environments.

Investigated the use of zero-valent iron in dechlorinating PCB in sediments and solvents in groundwater.

Demonstrated that a combination of micropurging and clean sampling techniques would preclude anomalous PCB detections in groundwater at a former chemical facility, Anniston, AL.

Evaluated the source/distribution relationships of PCBs from paper mill facilities to sediment in the Fox River, MN.

Quantified the volume of PCB-contaminated soils at the MGM Brakes Superfund site, CA.

*Evaluated the fate and transport of dioxin at 27 sites in Missouri.

Statistical Analysis

*Conducted ordinary and probability kriging to assess the distribution of arsenic in soils in the vicinity of the Tacoma smelter, WA.

*Investigated hydrology of, and sediment transport in, the Copper River watershed, AK.

Kriged groundwater levels and developed residual maps to test the adequacy of a groundwater sampling network, Rocky Mountain Arsenal, CO.

Tanneries

Conducting laboratory, field, and statistical analyses in support of a numerical model designed to assess the past and future transport of Na, Cl, Cr, NH₃, and SO₄ emanating from a dense aqueous phase liquid in groundwater, Wilmington, MA.⁷⁴

Interpreted the fate and transport of Cr at a historic tannery, Sault Ste. Marie, MI.

Bioavailability/Risk Assessment

Evaluated the factors controlling the dissolution rate of Pb-bearing minerals in the gastrointestinal tract.^{15, 39}

Responsible for laboratory studies investigating the *in vivo* and *in vitro* bioavailability of Pb from mine waste, slags, and aggregates. The program contributed to a 1,200 mg/kg ROD decision in Butte, MT.^{12, 14, 16, 19, 21, 26, 30}

Assessed As geochemistry in relation to bioavailability of smelter waste in Anaconda, MT.^{20, 36, 40}

Responsible for a lead bioavailability analysis of dusts in a building adjacent to the former World Trade Center towers, NY.

Demonstrated low lead bioavailability in residential soils enriched with mine waste in Aspen, CO. Based on TAC recommendations, the EPA has not pursued soil removal.²⁴

Responsible for characterization and geochemical evaluation of the bioavailability and *in situ* remediation of lead-bearing soils at historical smelter sites in Salt Lake City, UT.²⁸

Principal investigator for an *in vitro* study that demonstrated that the bioaccessibility of chlordane and DDX was a fraction of the 50% default value assumed in risk assessments.

Soils

Investigated soil-As records of decision (RODs) between 1985 and 1998.³¹

*Used column experiments to assess the migration of arsenic, copper, lead, and zinc to groundwater from soils impacted by tailings deposits, Clark Fork River, MT.

Designed a program to collect and analyze 850 soil samples in Butte, MT.

Evaluated the effect of creating a sewage lagoon on arsenic-laden soils in Anaconda, MT. Conducted laboratory experiments in conjunction with geostatistical analysis (kriging) of field data to predict the potential mobility of arsenic in the subsurface.⁵

*Assessed the hydrogeology, geochemistry, and phytotoxicity of salt crust development in a playa environment, Elko, NV.

Demonstrated that x-ray fluorescence would function as a viable analog for more costly ICP analysis in soils at three Superfund sites in Colorado, Utah, and Montana.⁴

Natural Gas/Condensate

Demonstrated *de micromis* contribution of CBM reservoir water to a local surface water in the Powder River Basin, WY.

Source definition of a condensate gas pool in McAllen, TX.

Evaluated natural versus anthropogenic impacts to soils and groundwater at a Carpinteria, CA, topping facility.

Sundry Compounds

Responsible for source identification and characterization of the fate and transport of N-nitrosodimethylamine (NDMA) in Wilmington, MA, groundwater.

Investigated the transport of paraldehyde at the Mansion Grove site.

Responsible for a risk assessment that demonstrated no adverse effect of NaSO₄ disposed at a tailings facility in the Owens Lake bed, CA.

Demonstrated that formaldehyde would degrade rapidly in groundwater in Oregon.

Evaluated potential for linear alkyl benzene degradation at a former toll processing facility, Arlington, TN. Represented client in cost allocation negotiations with the EPA.

Selected Publications

In Press

⁴⁹**Davis A.**, Hoenke, K., Moomaw, C. Monitored natural attenuation applied to chlorinated pesticides in groundwater at the Marzone Superfund site. *Contaminated Soils*, vol. 5. Amherst, MA: University of Massachusetts Press.

Published

Helgen, S., **Davis, A.**, Nicholson, A. 2007. Apportioning mining waste at a Superfund site using four-component linear mixing, Lower Area One, Butte, Montana, USA. *Environ. Forensics* 8:107-118.

Eary, L.E., **Davis, A.** 2007. Geochemistry of an acidic chromium sulfate plume. *Appl. Geochem.* 22:357-369.

⁷⁵**Davis, A.**, Bellehumeur, T., Hunter, P., Hanna, B., Fennemore, G.G., Moomaw, C., Schoen, S. 2006. The nexus between groundwater modeling, pit lake chemogenesis and ecological risk from arsenic in the Getchell main pit, Nevada, USA. *Chem. Geol.* 228:175-196.

⁷³**Davis, A.**, Howe, B., Nicholson, A., Hoenke, K. 2005. Use of geochemical forensics to determine release eras of petrochemicals to groundwater, Whitehorse, Yukon. *Environ. Forensics* 6:253-271.

⁷²Nicholson, A., **Davis, A.**, Helgen, S. 2004. Response to invited comment on Nicholson et al. 2003. Elements influencing cost apportionment in the Pinal Creek aquifer, Arizona USA. Part II: Identification of geochemical controls on remediation time. *Environ. Forensics* 5:127-133.

⁶⁰**Davis, A.**, Fennemore, G.G., Peck, C., Walker, C.R., McIlwraith, J., Thomas, S. 2003. Degradation of carbon tetrachloride in a reducing groundwater

environment: Implications for natural attenuation *Appl. Geochem.* 18:503-525.

⁷¹**Davis, A.** 2003. Elements influencing cost apportionment in the Pinal Creek aquifer, Arizona USA: An overview. *Environ. Forensics* 4:245-253.

⁶⁸Helgen, S., **Davis, A.**, Nicholson, A. 2003. Elements influencing cost apportionment in the Pinal Creek aquifer, Arizona USA. Part I: Geochemical fingerprinting and source delineation. *Environ. Forensics* 4:255-269.

⁶⁹Nicholson, A., **Davis, A.**, Helgen, S. 2003. Elements influencing cost apportionment in the Pinal Creek aquifer, Arizona USA. Part II: Identification of geochemical controls on remediation time. *Environ. Forensics* 4:271-286.

⁷⁰Moomaw, C., **Davis, A.**, Helgen, S. 2003. Elements influencing cost apportionment in the Pinal Creek aquifer, Arizona USA. Part III: Quantifying metal releases from multiple sources. *Environ. Forensics* 4:287-303.

⁶⁶Fontaine, R.C., **Davis, A.**, Fennemore, G.G. 2003. The comprehensive realistic yearly pit transient infilling code (CRYPTIC): A novel pit lake analytical solution. *Mine Water Environ.* 187-193.

⁶⁵**Davis, A.** 2003. A screening-level laboratory method to estimate pit lake chemistry. *Mine Water Environ.* 194-205

⁶¹**Davis, A.**, Fennemore, G.G., Moomaw, C., Buffington, R. 2002. Innovative strategies in remediating mining wastes. In *Handbook of Complex Environmental Remediation Problems*. Boca Raton, FL: CRC Press.

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